PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 9792350-0044	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US02/11586	International filing date (*day/month/year*) 12 April 2002 (12.04.2002)	(Earliest) Priority Date (*day/month/year*) 20 June 2001 (20.06.2001)
Applicant LEWIS GRUBER		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the Report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
   ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:
   ☐ contained in the international application in written form.
   ☐ filed together with the international application in computer readable form.
   ☐ furnished subsequently to this Authority in written form.
   ☐ furnished subsequently to this Authority in computer readable form.
   ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
2. ☐ **Certain claims were found unsearchable** (See Box I).
3. ☐ **Unity of invention is lacking** (See Box II).
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. ____
   ☐ as suggested by the applicant.
   ☐ because the applicant failed to suggest a figure.
   ☐ because this figure better characterizes the invention.
   ☒ None of the figures

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/11586

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12Q 1/68; C12M 1/34; C07H 21/02, 21/04, 19/00, G02B 5/18
US CL : 435/6, 287.2; 536/22.1, 23.1, 24.3, 24.31, 24.32, 24.33; 359/566

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 435/6, 287.2; 536/22.1, 23.1, 24.3, 24.31, 24.32, 24.33; 359/566

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,776,674 A (ULMER) 07 July 1998, (07.07.1998), see whole document especially abstract, col.1 lines 45-62, col. 5 lines 17-30 & col. 7 lines 27-44, see entire document.	1-87, 155-157
Y	US 6,055,106 A (GRIER et al) 25 April 2000 (25.04.200), see whole document especially col. 3 lines 60-65, col.4 lines 56-65 & col. 5 lines 53-64, see entire document.	88-154

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 September 2002 (15.09.2002)	01 OCT 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Jeffrey Siew Telephone No. 703-308-0196

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

PCT/US02/11586

Continuation of B. FIELDS SEARCHED Item 3:
EAST-USAT, USPGPUB, EPO,JPO,DERWENT, IBM-TDB,
STN-BIOSIS, MEDLINE,CANCERLIT,BIOTECHDS,LIFESCI,CAPLUS, EMBASE
search terms: optical trap, tweezer, beamlet, beam multiple,

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:
JEFFREY F. CRAFT
SONNENSCHEIN NATH & ROSENTHAL
P.O. BOX 06180
WACKER DRIVE STATION, SEAR TOWER
CHICAGO, IL 60606

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of Mailing (*day/month/year*)	26 JUN 2003
Applicant's or agent's file reference 097923500045	REPLY DUE within 2 months/days from the above date of mailing

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US02/11586	12 April 2002 (12.04.2002)	20 June 2001 (20.06.2001)

International Patent Classification (IPC) or both national classification and IPC

IPC(7): C12Q 1/68; C12M 1/34; C07H 21/02, 21/04, 19/00, G02B 5/18 and US Cl.: 435/6, 287.2; 536/22.1, 23.1, 24.3, 24.31, 24.32, 24.33; 359/566

Applicant

ARRYX, INC.

1. This written opinion is the first (first, etc,) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2 (a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension. See rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.
For an informal communication with the examiner, see Rule 66.6

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 20 October 2003 (20.10.2003) .

Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized Officer Jeffrey Siew Telephone No. 703-308-0196

Form PCT/IPEA/408 (cover sheet)(July 1998)

WRITTEN OPINION

International application No.
PCT/US02/11586

I. Basis f the opinion

1. With regard to the elements of the international application:*

☒ the international application as originally filed

☒ the description:
pages 1-17, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☒ the claims:
pages 18-35, as originally filed
pages NONE, as amended (together with any statement) under Article 19
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☒ the drawings:
pages 1-5, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☐ the sequence listing part of the description:
pages NONE, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages NONE _____

☐ the claims, Nos. NONE _____

☐ the drawings, sheets/~~fig~~ NONE _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed."*

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citati ns and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 88-154	YES
	Claims 1-87,155-157	NO
Inventive Step (IS)	Claims NONE	YES
	Claims 1-157	NO
Industrial Applicability (IA)	Claims 1-157	YES
	Claims NONE	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-87 and 155-157 lack novelty under PCT Article 33(2) as being anticipated by (US 5,776,674, 07 July 1998).

Ulmer teach the apparatus and method of using an movable optical trap to capture bound and unbound multiple probes and trapping the probes and tracking the probe as it interacts with a target (see whole document esp. abstract, col. 1 lines 45-62, col. 5 lines 17-30 and col. 7 lines 27-44). They teach a multi-position scanning laser trap which is used to translate multiple single molecule complexes in parallel as in an array fashion for increased throughput. Particles can be moved independently (see col.12 lines 37-45). They teach that Multibeam photonic Tweezers for use of multiposition traps (see col. 12 line 49). They teach the use of laser tweezers traps (see col.1 line 49 and col. 1 line 39). A computer is operably connected to apparatus (see col.12 line 21). They teach the use of video camera (see col. 2 line 44). They teach that optical trap may include objective lens and beam (see figure 2A-2H and col. 2 line 50-52). They teach the use of various lasers and fluorescent dyes to detect the spectrum of the label (see col. 10 line 62 -col.11 line 21). They teach the assay of several biological and chemical material such as antigen and antibody, DNA oligonucleotide extensions (see col. 5 lines 17-30 and col.6 line 15-42). They teach the use of subcells or regions in which the particles are moved (see Figure 3A & col. 4 lines 30-40).

Claims 88-154 lack an inventive step under PCT Article 33(3) as being obvious over Ulmer et al (US 5,776,674, 07 July 1998) in view of Grier et al (US 6,055,106 25 April 2000).

Ulmer teach the apparatus and method of using an movable optical trap to capture bound and unbound multiple probes and trapping the probes and tracking the probe as it interacts with a target (see whole document especially abstract, col. 1 lines 45-62, col. 5 lines 17-30 and col. 7 lines 27-44). They teach a multi-position scanning laser trap which is used to translate multiple single molecule complexes in parallel as in an array fashion for increased throughput. Particles can be moved independently (see col.12 lines 37-45). They teach that Multibeam photonic Tweezers for use of multiposition traps (see col. 12 line 49). They teach the use of laser tweezers traps (see col.1 2line 49 and col. 1 line 39).. A computer is operably connected to apparatus (see col.12 line 21). They teach the use of video camera (see col.2 line 44). They teach that optical trap may include objective lens and beam (see figure 2A-2H and col. 2 line 50-52). They teach the use of various lasers and fluorescent dyes to detect the spectrum of the label (see col. 10 line 62 - col.11 line 21). They teach the assay of several biological and chemical material such as antigen and antibody, DNA oligonucleotide extensions (see col. 5 lines 17-30 and col.6 line 15-42). They teach the use of subcells or regions in which the particles are moved (see Figure 3A and col. 4 lines 30-40).

Grier et al teach the formation of various beam patterns to create arrays of optical traps (see whole document and col.3 line 60-65). They teach the use of diffractive optical element which can include computer generated holograms which split the input light beam into patterns of different regions (see col. 4 lines 56-65). They teach the beams then enter the back aperature 24 of objective lens 20 (see Figure 3). They also teach the use of dichroic beamsplitter to split beam (see col. 5 line 53-64). They teach dynamically translating of traps (see col.5 lines 22-44).

One of ordinary skill in the art would have been motivated to apply Grier et al's teaching of multiple optical trap to Ulmer et al's method of assaying in order to increase the throughput of samples.

WRITTEN OPINION

International application No.
PCT/US02/11586

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

TIME LIMIT:
The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.